PARAMETERS OF A DECLINING BURROWING OWL POPULATION IN SASKATCHEWAN

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A declining population of Burrowing Owls was studied on the heavily cultivated Regina Plain of Saskatchewan from 1986 to 1992 by trapping adults and chicks. Information is presented on age, breeding, mortality, breeding dispersal, natal dispersal, and mate fidelity in the population. In no year did chick production offset annual adult mortality, hence, the observed decline. Chick production seemed to be consistent with historical records suggesting that mortality in the population is currently too high.

DEMOGRAPHY AND POPULATION DYNAMICS OF THE BURROWING OWL

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I used deterministic, age-structured analytic models to 1) examine the demographic causes of projected and observed declines in the size of a color-marked, Burrowing Owl population, and 2) predict persistence time for the population. Estimates of Burrowing Owl demographic parameters were calculated from direct observations and from genetic analyses of reproductive success, and represented a range of possible values. Comparison of theoretical expectations (based on actual demographic traits) with the real dynamics of the population over ten years showed that the population declined to reproductive extinction in half the time predicted by the models. This discrepancy suggests that stochastic variation in demographic traits, possibly caused by weather, along with stochastic and deterministic changes in genetic structure, also contribute to the dynamics and persistence of Burrowing Owl populations.

REPRODUCTIVE SUCCESS, RELATEDNESS, AND MATING PATTERNS IN A COLONIAL BIRD, THE BURROWING OWL

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I used DNA fingerprinting to characterize patterns of mating, genealogies, and reproductive success in a wild population of color-marked, Burrowing Owls in Davis, California. This study was designed to evaluate whether behavioral assessments of individual reproductive performance and mating system agreed with estimates obtained by genetic analysis, and to measure the degree of genetic relatedness in a highly social resident aggregation of Burrowing Owls. The data revealed important discrepancies between patterns suggested by inference and those documented by direct genetic measurement. DNA fingerprints showed that in 20% of cases, genetically determined parent-offspring relationships and those suggested by direct behavioral observations disagreed. These differences were due to nestling movements and brood mixing, extra-pair fertilizations (which resulted in at least 5–10% of offspring), polygamy, and possibly intraspecific brood parasitism. These previously undocumented aspects of Burrowing Owl mating biology collectively resulted in alloparenting by 37% of the adult owls. Most of these behaviors can be expected to enhance within-population genetic heterogeneity and contribute to variation in individual reproductive success. However, analysis of multilocus fingerprint similarity suggested that the Davis Burrowing Owl population is inbred due to small deme size rather than nonrandom mating. Because inbreeding enhances selection between groups at the expense of opposing selection within groups, it can be expected to counter the effects of brood mixing and unequal reproductive contributions, and facilitate the evolution of Burrowing Owl social behavior.

SURVEY TECHNIQUE FOR BURROWING OWLS IN BADLANDS NATIONAL PARK, SOUTH DAKOTA

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Accurate counts of raptor populations are necessary for successful management, research and conservation programs. A method to efficiently and accurately make repeatable counts of breeding Burrowing Owls (*Athene cunicularia*) has not been available to wildlife managers. We attempted to develop such a census technique for Burrowing Owls in Badlands National Park. During June and July (incubation and hatching season in this area) of 1991 transects were established on five separate prairie dog towns within the park. Points, 300 m apart along the transect, were visited for ten minutes and owls were looked and listened for. Surveys were repeated an average of five times. In 1992, using the same techniques, surveys were repeated on the two towns on which we found owls in 1991, and were done twice on eight other towns in the park. Data were analyzed using the area occupied method We were able to establish a census technique for Badlands National Park which can be carried out by Park biologists with a minimum of training. Results can be compared between years, and form a framework for management of Burrowing Owls in the Park. We believe that this technique has application to other areas of the country where Burrowing Owls nest in semi-colonial situations.

REPRODUCTIVE ECOLOGY OF THE BURROWING OWL, *ATHENE CUNICULARIA FLORIDANA*, IN DADE AND BROWARD COUNTIES, FLORIDA

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During 1988 and 1990, a reproductive study of the ecology of the Burrowing Owl was conducted to determine sea-